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Wireless power transmission using technologies other than radio frequency beam in the 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz ranges; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Reference

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.6] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.3].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in Table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Proposed national transposition dates	
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The present document has been prepared to conform to the requirements of the new Radio Equipment Directive 2014/53/EU [i.3]. The present document covers wireless power transmission (WPT) systems using technologies other than radio frequency beam in the frequency ranges 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz.

In the context of the present document "power transmission via radio frequency beam" means power transmission by radio waves.

The present document is structured as follows:

Clauses 1 through 3 provide a general description on the types of equipment covered by the present document and the definitions, symbols and abbreviations used.

Clause 4 provides the technical requirements specifications, limits and conformance relative to transmitter and receiver.

Clauses 5 specifies the conditions for testing of the equipment and interpretation of the measurement results with the maximum measurement uncertainty values.

Clause 6 specifies the required measurement methods.

Annex A (informative) provides the relationship between the present document and the essential requirements of Directive 2014/53/EU [i.3].

Annex B (normative) provides the measurement setup specifically for Electric Vehicles.

1 Scope

The present document specifies technical characteristics and methods of measurements for wireless power transmission (WPT) systems using technologies other than radio frequency beam in the 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz ranges.

For the purpose of the present document WPT systems are classified into three different cases according to Table 1.

Table 1: Distinction between WPT systems cases with regard to the communication technology

WPT Cases (see note 3)	RE-D article 3.2	RE-D article 3.1b	EMC-D
1: only energy transmission, no data communication	N/A	N/A	CENELEC EN 55011 [i.7] Group 2 (or more specific CENELEC standard if applicable), see note 1
2: energy transmission and data communication in frequency ranges covered by the present document	ETSI EN 303 417 (the present document)	ETSI EN 301 489-1 [i.8] ETSI EN 301 489-3 [i.9]	N/A
3: energy transmission in frequency ranges covered by the present document and data communication in different frequency ranges	Based on the communication function, this case is a "combined equipment" according to RE-D (see ETSI EG 203 367 [i.5]). Therefore, two options for homologation could be used: • Option 1: energy transmission frequencies (the present document), data communication frequencies: related ETSI standard • Option 2: energy transmission frequencies CENELEC EN 55011 [i.7] (see note 1 and note 2), data communication frequencies: related ETSI standard		
NOTE 1: WPT systems are expected to be included in future revision of CENELEC EN 55011 [i.7]. NOTE 2: CENELEC EN 55011 [i.7] are to be listed under the related articles in the OJEU for RE-D. NOTE 3: The division into these three cases could change once ITU has finalized their work on WPT-systems in response to Question ITU-R 210-3/1 and WRC 19 Agenda Item 9.1, Issue 9.1.6 [i.11].			

The present document covers wireless power transfer systems according to cases 2 and 3 of Table 1, i.e. systems which consist of:

1) A power transmitter, with additional communication capability to control the charge function in conjunction with the receiving part. The power transmitter could also be named as charger.

2) A receiver, which supplies the received energy to a battery and performs a control/supervision function for the battery status and charge operation.

Both parts in combination are able to transmit and receive data in addition to the power transfer mode e.g. to control the battery status and to optimize the transfer mode.

These radio equipment types are capable of operating in the permitted frequency bands below 30 MHz as specified in Table 2.

The present document covers fixed systems, mobile and portable systems.

The limits and the frequency ranges of the present document are based on 2013/752/EU [i.2] and ERC/REC 70-03 [i.1].

For the clarification of open questions for high power wireless power transmission systems to charge vehicles a SRdoc ETSI TR 103 409 [i.4] was prepared. New specific requirements for such systems (e.g. higher H-field emission limits in the 79 - 90 kHz band) will be reflected within a future revision of the present document.

Table 2: WPT devices within the permitted frequency bands below 30 MHz

	Frequency Bands	Applications
Transmit and Receive	19 kHz to 21 kHz	WPT systems
Transmit and Receive	59 kHz to 61 kHz	WPT systems
Transmit and Receive	79 kHz to 90 kHz	WPT systems
Transmit and Receive	100 kHz to 119 kHz	WPT systems
Transmit and Receive	119 kHz to 140 kHz	WPT systems
Transmit and Receive	140 kHz to 148,5 kHz	WPT systems
Transmit and Receive	148,5 kHz to 300 kHz	WPT systems
Transmit and Receive	6765 kHz to 6795 kHz	WPT systems

NOTE 1: Ranges listed in Table 2 are also used for SRD, inductive devices, generic use.

NOTE 2: It should be noted that Table 2 represents the most widely implemented position within the European Union and the CEPT countries. At the time of preparation of the present document the frequency usage condition for all frequency bands were harmonised in the European Union.

NOTE 3: In addition, it should be noted that other frequency bands may be available in a country within the frequency range below 30 MHz.

The present document contains covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.3] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI EN 300 330 (V2.1.1) (11-2016): "Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] CEPT/ERC/REC 70-03: "Relating to the use of Short Range Devices (SRD)".

[i.2] EC Decision 2013/752/EU: "Commission implementing Decision of 11 December 2013 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC.

[i.3] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC Text with EEA relevance.

[i.4] ETSI TR 103 409: "System Reference document (SRdoc); Wireless Power Transmission (WPT) systems for Electric Vehicles (EV) operating in the frequency band 79 - 90 kHz".

[i.5] ETSI EG 203 367: "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".

[i.6] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.7] CENELEC EN 55011: " Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement".

[i.8] ETSI EN 301 489-1: "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".

[i.9] ETSI EN 301 489-3: "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".

[i.10] CISPR document CIS/B/663/CD: "Amendment 2 (f1) to CISPR 11: Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement - Requirements for air-gap wireless power transfer (WPT)".

[i.11] Question ITU-R 210-3/1 and WRC 19 Agenda Item 9.1, Issue 9.1.6.

NOTE: Available at http://www.itu.int/pub/R-QUE-SG01.210.

3 Definitions, Symbols and Abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 300 330 [1] and the following apply:

alignment: process of finding or mechanical implementation of the relative position of transmitter and receiver coil which allows a safe and efficient power transfer

NOTE: This alignment leads to the mechanical arrangement in which WPT system is designed to operate.

battery: transmitting/receiving mobile part of the Wireless Power Transmission (WPT) system, a combination of a coil, communication device and energy storage in one housing

charger: transmitting/receiving stationary part of the Wireless Power Transmission (WPT) system

co-Location: WPT systems are designed to work within an alignment

NOTE: All operation mode have such a close proximity between the parts of the WPT system compared to the wave-length that the parts of the WPT system (charger/battery) can be seen as co-located.

Electric Vehicle (EV): vehicle using one or more electric motors for propulsion

power transfer via radio frequency beam: power transfer by radio waves

test volume: volume in which the representative geometrical WPT system is in, including all cables, auxiliaries etc.

vehicle emulator: necessary transmitting/receiving parts for a EV Wireless Power Transmission (WPT) system (coil, communication device and representative mechanical vehicular arrangement)

worst-case alignment: alignment of primary coil (in the charger) and secondary coil (on the EV) which represents the worst case (e.g. with regards to emissions or efficiency)

NOTE: Typically, this is the case of lowest coupling between primary and secondary coil.

WPT system: combination of charger and battery as declared for the typical use-case

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 300 330 [1] apply.

L1, L2 connection points for ISN

NOTE: See clause 6.2.4.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CISPR	Comité International Spécial des Perturbations Radioélectriques
EUT	Equipment Under Test
EV	Electric Vehicle
ISN	Impedance Stabilization Network
OATS	Open Area Test Site
OBW	Operating BandWidth
OOB	Out-Of-band
SAC	Semi Anechoic Chamber
WPT	Wireless Power Transmission

4 Technical requirements

4.1 Environmental conditions

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile. The test conditions are defined in clause 5.3.

4.2 General

4.2.1 Background information

In this clause all general considerations for the testing of wireless power transmission (WPT) systems using technologies other than radio frequency beam in the 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz ranges are given. The tests cover all different operational modes, as described in clause 4.2.3.

All permitted ranges of operation of the equipment (see clause 4.3.2) shall be declared by the equipment manufacturer.